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Bell Labs Innovations



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February 16, 1999

By Hand

Ms. Magalie Salas
Office of the Secretary
Federal Communications Commission
The Portals
445 Twelfth Street, S.W., Room TW-A325
Washington, D.C. 20554

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FEB 16 1999

**FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY**

Re: Amendment of the Commission's Rules with Regard to the 3650-3700
MHz Government Transfer Band, ET Docket No. 98-237

Dear Ms. Salas:

Enclosed please find an original and nine (9) copies of Lucent Technologies Inc. Comments for filing in the above-referenced proceeding. Also enclosed is a copy to be stamped and returned for our files.

Please do not hesitate to contact me should there be any questions.

Sincerely,

Diane Law Hsu

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Before the
Federal Communications Commission
Washington, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of)
)
Amendment of the Commission's Rules)
With Regard to the 3650-3700 MHz) ET Docket No. 98-237
Government Transfer Band)
)

COMMENTS OF LUCENT TECHNOLOGIES, INC.

By *Diane Law Hsu*

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INTRODUCTION.

Lucent Technologies, Inc. ("Lucent") respectfully submits the following comments in response to the Commission's *Notice of Proposed Rulemaking* (NPRM), ET Docket No. 98-237, regarding a proposed allocation for fixed wireless in the 3650-3700 MHz band. Lucent supports several fixed wireless products: AirLoop®, SWING, WaveLan, and FLEXENT. The AirLoop® Wireless Local Loop System is a fixed wireless product using code division multiple access (CDMA) technology. The AirLoop® system offers customers digital clear voice connections and high-speed fax and modem links with data rates as high as 144 kbps for ISDN service and 512 kbps and above for packet data. SWING is a fixed wireless product based on Digital Enhanced Cordless Telecommunication (DECT) technology. The SWING system is a flexible, modular system that can provide either analog or digital interfaces with the local exchange for voice or data transmissions up to 64 kbps, with quality equal to or better than standard wireline technology. WaveLan is a wireless local area network solution that uses Radio frequency technology. FLEXENT is a fixed wireless product based on IS-95/CDMAOne technology. Accordingly, Lucent has expertise in manufacturing and deploying fixed wireless technologies and submits the following comments.

In the NPRM, the Commission stated that fixed wireless technologies may "lead to new and more effective competition to existing wireline local exchange carrier services by providing an economical means to offer competitive 'local loop' or 'last-mile' facilities."¹ The Commission also noted that fixed wireless technologies may be used to

¹ NPRM at para. 1.

deploy advanced telecommunications capabilities to all Americans.² As the Commission has noted in other proceedings, consumer demand and applications for high-speed data services have almost limitless possibilities. Moreover, with Internet access increasing exponentially and more applications being offered on multimedia platforms, the need to support high-speed data services on the local loop exists today. Thus, in order to meet the Commission's goal, i.e. fixed wireless local loop providing competitive "local loop" services and advanced telecommunications capabilities, Lucent believes the Commission should consider allocating additional spectrum to fixed wireless technologies.

While the Commission's proposed allocation of 50 MHz in the 3650-3700 MHz band is a good initial step towards the development of fixed wireless markets, it might prove to be insufficient to realize the Commission's objectives. This allocation will enable service providers, using available fixed wireless technologies, to offer voice and medium-speed data services. However, this allocation will not provide the capability to offer advanced telecommunications services envisioned for the near and distant future, including high-speed data services. This allocation may also forbid the use of certain fixed wireless technologies, thereby limiting the technology choices of service providers. For these reasons, Lucent suggests that the Commission consider adopting a forward-looking approach that will permit fixed wireless operators to offer the full panoply of telecommunications services, including high-speed data services. Lucent believes that an additional allocation of spectrum, sufficient to enable new and existing licensees seeking to provide multi-media and high-speed Internet service as well as voice and medium

² *Id.*

speed data, will serve the public interest by making possible increased local loop competition.

WHILE THE COMMISSION'S PROPOSED ALLOCATION IS A GOOD FIRST STEP, AN ADDITIONAL ALLOCATION FOR FIXED SERVICES MAY BE WARRANTED.

Lucent supports the Commission's proposed allocation of 50 megahertz in the 3650-3700 MHz band to fixed wireless services. However, an allocation of only 50 megahertz limits the type of fixed wireless services that may be provided over existing technologies, i.e. voice telephony and medium speed data. As the Commission noted, a 50 megahertz allocation is insufficient to support systems using Frequency Division Duplex (FDD) technology because FDD technology cannot be implemented with a 25 megahertz separation. Thus, only systems employing Time Division Duplex (TDD) technology will be viable in the proposed band.

Although TDD fixed wireless technology may be deployed in the 3650-3700 MHz band, this band is too narrow for service providers to implement systems, using DECT specifications, that are capable of providing high-speed two-way services, i.e. multimedia, high-speed Internet, or video on demand. If the Commission licenses two operators in the band, each TDD system using DECT specifications should be able to provide 120 channels for voice telephony and data transmission at rates up to 64 kbps. If the Commission licenses only one operator in the band, TDD systems may be able to provide higher data rates, i.e. up to ISDN. However, because of the limited amount of spectrum, TDD systems operating in this band must constantly balance, in a flexible way, higher data rates against the number of subscribers served. Thus, as demand for data rates beyond 64 kbps increases at a given point in time in a given location, a particular base station's capacity to handle simultaneous users may decrease, i.e. it may not be able

to accommodate 120 simultaneous voice channels. Therefore, unless additional spectrum is allocated, fixed wireless systems using DECT specifications will not be capable, if the dimension of the cells remains unchanged, of providing high-speed data services to large numbers of simultaneous users.

Lucent shares the Commission's belief that the deployment of fixed wireless services may lead to increased competition in the provision of "local loop" or "last-mile" services. However, for some operators, fixed wireless services cannot be considered a long-term alternative to the local loop if they are not capable of providing high-speed two-way services. If fixed wireless systems, as a result of allocation policies, are incapable of providing high-speed data services, many fixed wireless operators will be placed at a competitive disadvantage vis-à-vis wireline carriers, cable operators, and others that have those capacities. Thus, to facilitate the development of local loop competition, the Commission should consider allocating additional spectrum to enable fixed wireless systems to provide high-speed data services. If such allocations are adopted, Lucent also urges the Commission to ensure that their spectrum policies are pro-competitive and technology-neutral and that their policies permit the market to influence potential operators' technology choices.

ANY ADDITIONAL ALLOCATIONS SHOULD BE CONSISTENT WITH FOREIGN FIXED WIRELESS ALLOCATIONS.

Many foreign regulatory bodies³ faced with the same questions before the Commission in this proceeding, including Canada and Mexico,⁴ have chosen to allocate

³ For example, Mexico, Canada, Brazil, Saudi, Arabia, and Sweden permit fixed wireless services in the 3400-3600 MHz band. France, Germany, Italy, New Zealand, and the Philippines have proposed to allocate the 3.4-3.6 band for fixed wireless.

⁴ If the Commission does not harmonize fixed wireless allocations with Mexico and Canada, interference may occur in adjacent bands at the borders.

the 3400-3600 MHz band for fixed wireless services. They have concluded that at least a 200 MHz block of spectrum is needed to accommodate the growing demand for fixed wireless voice and high-speed data services. The Commission and American consumers should benefit from the knowledge compiled by foreign regulatory bodies. Accordingly, if the Commission investigates additional allocations for fixed wireless, Lucent urges the Commission to utilize the experiences of other regulatory bodies when making its decisions and suggests allocating the 3400-3600 MHz band to fixed wireless.

Harmonization of domestic fixed wireless allocations with foreign allocations also is desirable, because it will create global economies of scale needed to promote the development of these services. Commercial deployment of fixed wireless services has already commenced in other countries around the globe. If the Commission adopts an allocation policy consistent with those of other regulatory bodies, when the domestic fixed wireless market is ripe, operators will rapidly be able to choose from a wide variety of fixed wireless products. Requiring manufacturers to develop specific products for the domestic market may delay the introduction, increase the cost, and limit the variety of fixed wireless products.

In addition to allocating the 3400-3600 MHz band to fixed wireless, many foreign regulatory bodies⁵ have adopted pro-competitive, technology neutral bandplans that utilize 100 MHz duplex spacing. Many favor 100 MHz duplex spacing because it is the most spectrally efficient solution.⁶ Lucent supports 100 MHz duplex spacing, and we

⁵ For example, the following countries have or have proposed to permit 100 MHz duplex spacing: Argentina, Australia, Brazil, Canada, China, Columbia, Egypt, Finland, France, Germany, India, Italy, Mexico, New Zealand, Philippines, Saudi Arabia, Spain, and Sweden.

⁶ 100 MHz duplex spacing is more spectrally efficient because, when 100 MHz is available in each half band, it allows a flexible sharing of the assigned bands between the operators. On the contrary, with 50 MHz duplex spacing, guard bands will be required between the two independent 100 MHz bands.

have seen from experience in other markets that equipment providers of FDD-based equipment offer their 3400 MHz systems for wireless local loop with 100 MHz duplex spacing. Some countries have adopted a bandplan that allows the co-existence of both 100 MHz and 50 MHz duplex spacing.⁷ This alternative would provide operators the option to choose either 100 MHz or 50 MHz duplex systems. If the Commission decides to allocate the 3400-3600 MHz band to fixed wireless, Lucent urges the Commission to adopt a flexible bandplan that utilizes 100 MHz duplex spacing as well as allows co-existence with 50 MHz duplex spacing.

Although the 3400-3600 MHz band is currently used by the military for radar operations in the United States, coordination with fixed services is technically feasible. Lucent is currently working with the Department of Defense to determine the guidelines necessary for the coexistence of our fixed wireless systems with U.S. military systems. Lucent supports the Commission's tentative conclusion that allocating the band to fixed service only, and not to land mobile services, will further reduce the possibility of harmful interference with military and government operations. Thus, given the economies of scale gained by allocating the band to fixed services and the fact that co-existence with military systems can occur, it would be feasible to allocate the 3400-3600 MHz band to fixed services only.

Finally, Lucent notes that Very Small Aperture Terminals (VSAT), providing fixed satellite services, operate in the same frequency band. Lucent believes that protection can be provided to VSAT terminals using the methodologies established by the International Telecommunications Union - Radiocommunication (ITU-R) Study Group 4-

Assuming guard bands of relatively equal size, 100 MHz duplex spacing requires half the spectrum for guard bands.

9S.⁸ Therefore, the Commission should examine and possibly adopt technical requirements based on the ITU-R Study Group's recommendations.

COMMISSION SHOULD FOLLOW ETSI OUT-OF-BAND EMISSION LIMITS.

In its NPRM, the Commission sought comment on whether it should apply an out-of-band emissions limit of $43+10 \log(p)$ dB to fixed wireless applications.⁹ Lucent notes that the European Telecommunications Standards Institute (ETSI) has already adopted an out-of-band emissions mask for fixed wireless applications.¹⁰ This standard has been commercially deployed in many regions and has worked successfully for fixed wireless systems. Thus, Lucent suggests that the Commission adopt an out-of-band limit that is no more restrictive than the CEPT recommendation, as adopted by the ETSI standards. Because manufacturers, including Lucent, currently support fixed wireless products that meet the ETSI standard, Commission adoption of similar requirements will enable service providers to utilize available fixed wireless products. This may reduce domestic fixed wireless deployment timetables and will enable service providers to benefit from global economies of scale.

COMMISSION SHOULD ADOPT POWER LIMITS LOWER THAN THOSE FOR PCS.

In its NPRM, the Commission sought comment on whether it should subject fixed wireless stations to power limits utilized for Broadband Personal Communications Services (PCS).¹¹ Alternatively, the Commission asked if a power limit of 1,000 watts

⁷ Canada has adopted such an approach.

⁸ See Document 4-9S/TEMP/51(Rev.3)-E, "Sharing methodology between fixed wireless access (FWA) systems in the fixed service and very small aperture terminals (VSATS) in the fixed-satellite service in the 3.4-3.7GHz range."

⁹ NPRM at para. 11.

¹⁰ See CEPT/ERC/REC 74-01, "Spurious Emissions."

¹¹ NPRM at para. 12.

peak e.i.r.p. with an antenna height of 600 feet (182.88 meters) would be more appropriate.¹² Because fixed wireless technologies utilize directional antennas, they are able to provide high quality transmissions at much lower power levels than PCS systems. Lower power levels reduce the possibility of interference and the need for coordination. Therefore, Lucent does not support the Commission's proposal to apply PCS power limits to fixed wireless services. Lucent believes that the Commission should encourage fixed wireless manufacturers to optimize their fixed wireless systems and operate at lower power limits. This belief is supported by the ITU, which has defined power limits for the 3 to 10 GHz spectrum bands that are significantly lower than PCS limits.¹³ Hence, Lucent believes it would be more appropriate for the Commission to adopt power limits that are lower than PCS levels, i.e. the ITU specification or a maximum power to 1,000 watts peak e.i.r.p. with a maximum antenna height of 600 feet.

CONCLUSION.

Lucent encourages the Commission to adopt pro-competitive, technology-neutral policies that encourage the deployment of high-speed data services. Accordingly, we support the Commission's initiatives to spur the development of the fixed wireless industry in the United States. However, the Commission's proposed allocation for fixed wireless in the 3650-3700 MHz band may not serve as a long-term alternative for fixed wireless providers seeking to offer high-speed data services, because it will enable them to offer only medium-speed data services. In order for fixed wireless providers to meet the expected demand for fixed wireless services, they should be able to provide competitive, high-speed data services. Consequently, an additional allocation for fixed

¹² *NPRM* at note 34.

¹³ ITU-R Radio Regulation 831, "ITU Radio Regulations Part 1."

wireless services may be necessary. Lucent urges the Commission to learn from other regulatory bodies' experiences and consider allocating the 3400-3600 MHz band to fixed wireless services. Harmonization of domestic allocations for fixed wireless services with foreign allocations will enable domestic service providers to take advantage immediately of the wide variety of fixed wireless products already available in international markets. This will benefit the public interest by permitting the development of a competitive high-speed data service and reducing deployment times when domestic service providers enter the fixed wireless market.